

Résumé de thèse*

Quantitative composition of egg protein, lipid, fatty acid, and free amino acid in common dentex (*Dentex dentex* L.) and their relations to viability and larval development, par Seyed-Mohammadreza SAMAEI (1).

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Although most of marine pelagophil teleosts are able to produce large quantities of viable eggs in captivity, the survival rate of produced larvae is low and substantially variable (in a non-predictable way) among different egg batches. This represents a bottleneck for industrial scale production of the species. This study defining relationships between egg intrinsic biochemical factors content and embryo/larva viability not only is addressing a crucial aspect of reproductive biology but also serves as a departure point to establish more reliable egg quality tests in mariculture systems.

Viable and fertilized eggs of common dentex, *Dentex dentex*, were obtained from spawning of broodfish in captivity. Egg biometric (egg wet mass, dry mass, and water content) and embryo/larva viability parameters, as egg quality representatives (egg floating rate, hatching rate, and larval survival rate at days 0 to 5 post-hatching) were recorded. Quantitative composition of egg vitellogenin (Vtg) derived proteins, lipids, fatty acids (FA), free amino acids (FAA), and non-Vtg-derived proteins were determined. The analysis of variance, Pearson's correlation coefficient, simple and multiple regression models, and path coefficient analysis were used to correlate the egg biochemical factor content (as independent variables) to embryo/larva viability parameters (as dependent variables).

The egg (i) Vtg-derived proteins [VtgA (22.22 kDa proteins) and VtgB (77.97, 57.22, 17.69, and 16.95 kDa proteins)], (ii) lipids (SM, PC, SE+W/TAG, and PS+PI), (iii) FAs (14:0, 18:1(n-9), Σ 18:1, Σ MUFA, 18:3(n-3), 20:5(n-3), 22:6(n-3)/20:5(n-3), 20:5(n-3)/20:4(n-6), and 20:5(n-3)+20:4(n-6)), (iv) FAAs (TFAA, Glu, Asn, Gln, Arg, Val/Arg, Ile/Leu, Asp/Ser, Asp/Gln, Glu/Ser, Glu/Gln, Glu/Gly, Ser/Ala, Gln/Ala, Tyr/Asp, Asn/Gly, Asn/Ala, Asn/Pro, Asn/Cys, Arg/Asp, Arg/Glu, Arg/Gly, Arg/Ala, Arg/Asp, Thr/Glu, Thr/Ala, His/Glu, His/Ala, Thr/Asp, and Ala/Cys), and

(v) non-Vtg-derived proteins (105.43, 63.77, 50.48, 43.50, 33.59, 32.41, 31.40, 26.65, 25.56, 24.86, 24.01, 23.45, 22.85, 20.44, and 19.59 kDa) were significantly correlated with embryo/larva viability. The putative egg Vtg-derived proteins, lipids, FAs, FAAs, and non-Vtg-derived proteins were correlated to embryo/larva viability through 27 ($R^2 = 0.095-0.634$), 5 ($R^2 = 0.459-0.739$), 38 ($R^2 = 0.641-0.859$), 49 ($R^2 = 0.605-0.875$), and 55 ($R^2 = 0.079-0.637$) simple regression models.

Conclusions: (i) The egg biochemical factors considered in this study were significantly correlated with embryo/larva viability of marine fish. Although obvious physiological basis was not found for some of the correlations, others were very likely linked to embryo and larval success and are worth of further investigations. These statistical findings suggest the need for a more suitable experimental approach to find the biological grounds for the significant relationships found in the current study. (ii) The common dentex egg protein content was correlated with both early (hatching rate and larval survival rate at days 0 and 1 posthatching) and later (larval survival rate at days 2 to 5 posthatching) developmental stages while others were correlated either with early (lipids and FAAs) or late (FAs) developmental stages. (iii) A series of statistical evidences was provided to show the effects of interrelations, both within and between the egg biochemical factors, on the significant relationships found in this study.

Lipids and fatty acid abbreviations:

SM: sphingomyelin; PC: phosphatidylcholine; W: wax; SE: steryl ester; TAG: triacylglycerol; PS: phosphatidylserine; PI: phosphatidylinositol; MUFA: monounsaturated fatty acids; TFAA: total free amino acid; Glu: glutamic acid; Asn: asparagine; Arg: arginine; Val: valine; Ile: isoleucine; Leu: leucine; Asp: aspartic acid; Ser: serine; Gln: glutamine; Ala: alanine; Tyr: tyrosine; Gly: glycine; Pro: proline; Cys: cystine; Thr: threonine; His: histidine.

Key words. - Sparidae - *Dentex dentex* - Egg intrinsic biochemical factors - Egg quality - Embryo/larva viability - Mariculture - Pelagophil teleosts.

* A pdf of this PhD thesis is available at: <http://www.mnhn.fr/sfi/sfi/8.theses/8.theses.html>

(1) Department of Organismic Biology, Faculty of Natural Sciences, University of Salzburg, Hellbrunnerstrasse 34, A-5020 Salzburg, AUSTRIA. [mohammadreza_samaei@yahoo.com]